CLAIMS

1. A substituted polyaniline polymer capable of converting between a self-doped form and a non-self doped form by a reversible chemical reaction.

2. The polymer according to claim 1 having a hardness of at least 0.03 GPa.

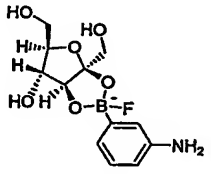
3. The polymer according to claim 1 having a molecular weight of at least 10,000.

4. The polymer according to claim 1 having a molecular weight of at least 100,000.

5. A polymer capable of converting between a self-doped form and a non-self doped form by a reversible chemical reaction.

6. A self-doped polyaniline capable of converting between:

a water-soluble self-doped form comprising repeating units as shown below



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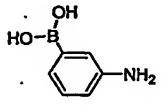
; and

a water-insoluble non-self-doped form comprising repeating units as shown below:



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wherein the water-soluble form is converted to the water-insoluble form by reducing fluoride concentration of the polymer.

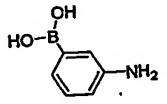
7. The polyaniline according to claim 6 having a hardness of at least 0.03 GPa.

8. The polyaniline according to claim 6 having a molecular weight of at least 10,000.

9. The polyaniline according to claim 6 having a molecular weight of at least 100,000.

10. A method of making a self-doped polyaniline comprising:

(a) providing a monomer:



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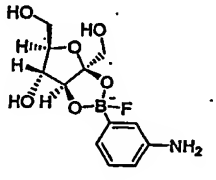
, D-fructose and fluoride;

(b) incubating said monomer, the D-fructose and the fluoride under conditions suitable for polymerization, thereby producing a first polymer:



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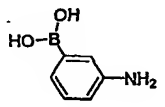
(c) precipitating said polymer by reducing the fluoride concentration, thereby producing a second polymer:



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11. The method according to claim 10 including:

(d) heating the second polymer, thereby forming a cross-linked polymer.

12. The method according to claim 10 having a hardness of at least 0.03 GPa.

13. The method according to claim 10 having a molecular weight of at least 10,000.

14. The method according to claim 10 having a molecular weight of at least 100,000.